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A New Genus and Species of Atherinid fish, *Dentatherina merceri* from the Western Pacific

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Abstract *Dentatherina merceri,* a new genus and species, is described from specimens collected in an area extending from the Philippines to north-eastern Australia and from the Moluccas to the Trobriand Islands. On the basis of osteological characters involving the cranium, jaws and caudal skeleton, the new species is considered distinct from every other silverside examined and is therefore placed in a subfamily of its own, the Dentatherininae. The new subfamily's closest affinity appears to be with the Atherininae which encompasses most of the marine silverside genera of the Old World.

Whilst sorting through the collection of silversides in the U. S. National Museum of Natural History (USNM) in 1979, we came across an unknown species of very small size. Subsequent examination revealed that many of the specimens were sexually mature, with enlarged ripe gonads and well developed skeleton. The USNM collection is well represented by specimens from the Philippines, New Guinea, Borneo, the Moluccas and other parts of Indonesia. The same species has also been recently collected from One Tree and Lizard Islands off the north-eastern coast of Australia by Patti Schmidt, a graduate student from the University of Sydney. Despite the small size, the new species is readily distinguishable from all other Old World silversides and although it clearly belongs to the family Atherinidae, it is distinct and different from all of the previously described genera.

Materials and methods

The methods for counts and measurements are predominantly based on those of Munro (1967). His technique has been modified in several instances: the interdorsal scale count is taken from the origin of the last spine of the first dorsal fin along the mid-dorsal line. The predorsal scale count includes all the scales in mid-dorsal line from the head to the origin of the first dorsal. The transverse scale count is made up of three components: the first set of counts are those taken from the origin of the first dorsal fin diagonally downwards and forwards to the upper edge of the midlateral band. The second comprises the scales covering the midlateral band and the third consists of scales counted diagonally upwards to the lower edge of the midlateral band from the origin of the ventral fins. The midlateral scale count is always taken as the number of scales between the dorsal origin of the pectoral fin and the hypural joint. The position of the origin of the first dorsal fin is recorded as a number of scales in front of vertical through ventral fin tips and as a number of scales behind vertical through pectoral fin tips. The position of the origin of the ventral fins is recorded as a number of scales in front of or behind vertical through the tips of pectorals. Since the body scales are extremely deciduous in *Dentatherina merceri,* their number had to be frequently inferred from the scale pockets or melanophore outlines which in many specimens delineate the body scales. All measurements were made with dial calipers which were read to the nearest 0.1 mm. Each body interval, such as the head length, is expressed as the standard length (SL) divided by the actual measurement of that body interval, unless otherwise indicated. Morphometric measurements and meristic counts have been recorded for 30 specimens (Table 1), which are designated as holotype and paratypes.

Osteological studies are based on alizarin preparations. The technique to prepare the alizarin specimens was taken from Taylor (1967).

Cartilage was stained according to the method proposed (but yet unpublished) by Taylor and Van Dyke. The suspensorium was dissected away to give a clearer view of the endocranium. Comparative study of osteology was made essentially on alizarin specimens previously prepared and examined by Patten (1978). Most of these specimens are uncatalogued unless otherwise indicated in the list below (AMS—The Australian Museum, Sydney; SU—California Academy of Sciences, San Francisco).

Alizarin preparations (numbers examined in brackets)

Dentatherina merceri: AMS I.22652–002, Tanjung Liang, Piru Bay, Ceram, Moluccas, Indonesia, 3°S 128°50′E (collected together with the holotype) (7); USNM 230372, Pulau Ajer, Seribu, Indonesia, 5°46′S 106°35′E (1); USNM 230366, Kiriwina Island, Trobriand Islands, Papua New Guinea, 8°30′S 150°59′E (3); USNM 230371, Putic Island, Palawan Province, Philippines, 10°55′N 121°02′E (5); One Tree Island, Queensland, Australia, 23°30′S 152°05′E (1).

Allanetta mugiloides: Roebourne, Western Australia, 20°47′S 117°09′E (4); Perth, Western Australia, 31°57′S 115°51′E (10); Port Hedland, Western Australia, 20°18′S 118°35′E (5); Exmouth Gulf, Western Australia, 22°05′S 114°15′E (6).

Craterocephalus honoriae: Smiths Lake, N.S.W., Australia, 32°23′S 152°29′E (10). *C. capreoli*: Exmouth Gulf, Western Australia, 22°05′S 114°15′E (1); Port Hedland, Western Australia, 20°18′S 118°35′E (3). *C. eyresii*: Lake Bonney, South Australia, 34°15′S 140°28′E (13); Peel River, N.S.W., Australia, 31°05′S 150°56′E (2). *C. marjoriae*: Tabulam, N.S.W., Australia, 28°53′S 152°37′E (3); Gayndah, Queensland, Australia, 25°37′S 151°37′E (1); Gympie, Queensland, Australia, 26°11′S 152°40′E (18). *C. cuneiceps*: Murchison River, Western Australia, 27°50′S 114°41′E (10). *C. pauciradiatus*: Exmouth Gulf, Western Australia, 22°05′S 114°15′E (3). *C. stercusmuscarum* (northern subspecies): Mackenzie River, Queensland, Australia, 23°36′S 148°33′E (1); Mulgrave River, Queensland, Australia, 17°06′S 145°47′E (3); Cairns, Queensland, Australia, 16°55′S 145°46′E (4). *C. stercusmuscarum* (southern subspecies): Manilla, N.S.W., Australia, 30°45′S 150°43′E (2); Fraser Island, Queensland, Australia, 25°20′S 153°14′E (4); Goondiwindi, Queensland, Australia, 28°33′S 150°18′E (5). *C. randi*: Fly River, Papua New Guinea, (1). *C. dalhousiensis*: Dalhousie Springs, South Australia, 26°28′S 135°29′E (7). *C. lacustris*: Lake Kutubu, Papua New Guinea, 6°24′S 143°18′E (7). *C. nouhuysi*: AMS I. 17319–001, Lorentz River, West Irian (1, paralectotype).

Atherina boyeri: Etang de L'Olivier, France (1); Veerse Lake, Netherlands (2). *A. hepsetus*: Port Banyuls, France (2).

Atherinosoma presbyteroides: Lauderdale, Tasmania, 42°54′S 147°30′E (3); Granville Harbour, Tasmania, 41°49′S 145°01′E (1); Ceduna, South Australia, 32°08′S 133°41′E (5); Peterborough, Victoria, Australia, 38°36′S, 142°52′E (2); Narooma, N.S.W., Australia, 36°13′S 150°09′E (2); Jervis Bay, N.S.W., Australia, 35°03′S 150°44′E (7); Koombana, Western Australia, 33°18′S 115°39′E (3). *A. microstoma*: Lauderdale, Tasmania, 42°54′S 147°30′E (9); Lake Illawarra, N.S.W., Australia, 34°32′S 150°52′E (2); Eden, N.S.W., Australia, 37°04′S 149°55′E (3); Scamander River, Tasmania, 41°24′S 148°05′E (5). *A. elongata*: Pine Point, South Australia, 34°34′S 137°53′E (7); Ceduna, South Australia, 32°08′S 133°41′E (5); Koombana, Western Australia, 33°18′S 115°39′E (2).

Atherinason sp.: Margate Beach, Tasmania, 43°02′S 147°16′E (3). *A. esox*: Lauderdale, Tasmania, 42°54′S 147°30′E (1); Port Broughton, South Australia, 33°36′S 137°56′E (4). *A. hepsetoides*: Freycinet Peninsula, Tasmania, 42°12′S 148°19′E (2); Jervis Bay, N.S.W., Australia, 35°03′S 150°44′E (1).

Hypoatherina tropicalis: One Tree Island, Queensland, Australia, 23°30′S 152°05′E (2); Lord Howe Island, Australia, 31°32′S 159°04′E (1). *H. temminckii*: Port Moresby, Papua New Guinea (2); New Ireland, (2). *H. barnesi*: Hamburg Bay, Emirau Island (2). *H. ovalaua*: Abaiang Atoll, Gilbert and Ellice Islands (1); Numa Numa District, Papua New Guinea (1). *H. valenciennesi*: Hong Kong (1).

Stenatherina panatela: Malaita Island, Solomon Islands (1); Emirau (1).

Atherinomorus duodecimalis: Put Put Harbour, New Britain (1). *A. endrachtensis*: Western Australia, 17°58′S 122°14′E (4); *A. ogilbyi*: Broome, Western Australia, 17°58′S 122°14′E. *A. capricornensis*: One Tree Island, Queensland,

Australia, 23°30′S 152°05′E (2). *A. lacunosus*: Port Douglas, Queensland, Australia, 16°32′S 145°29′E (3).

Telmatherina ladigesi: aquarium specimens (3).

Pseudomugil signifer: Smiths Lake, N.S.W., Australia, 32°23′S 152°29′E (5); Mundubbera, Queensland, Australia, 25°35′S 151°18′E (4).

Melanotaenia splendida splendida: aquarium specimens (2). *M. s. australis*: Wittenoom Gorge, Western Australia, 22°17′S 118°19′E (2). *M. fluviatilis*: Goondiwindi, Queensland, Australia, 28°33′S 150°18′E (4).

Atherion maccullochi: AMS I. 5570, Lord Howe Island, Australia, 31°32′S 159°04′E (1). *A. elymus*: AMS IB. 7729, Holbourne Island, Queensland, Australia, 19°44′S 148°22′E (1).

Iso rhothophilus: Seal Rocks, N.S.W., Australia, 32°26′S 152°32′E (3).

Menidia menidia: New York, New York, U.S.A. (5).

Atherinops affinis: Magdalena Bay, Baja California, Mexico (2).

Neostethus villadolidi: SU 32355, Dumaguete, Philippines (5).

Ceratostethus bicornis: SU 35783, Krangi River, Singapore, Malaya (4).

Gullaphallus mirabilis: SU 38903, Molawin Creek, Laguna, Luzon, Philippines (5).

Description

Dentatherininae subfam. nov.

Diagnosis. Parasphenoid with large lateral wings beneath orbits; anterior frontals much narrower than lateral ethmoids; maxilla with large spatulate process from anterior leading edge; submaxillary meniscus ossified; dentary with large excavation of ventral border near symphysis; calcified nodules in labial ligament; metapterygoid and symplectic fused; ectopterygoid and quadrate fused; branchiostegals usually five; temporal canal in two parts, on sphenotic and pterotic; caudal skeleton comprised of fused hypurals 3 and 4 with hypural 5 fused to uroneurals and ural centrum; single epural; parhypural basal spine directed anteriorly; ventral postcleithrum with very elongate ventro-posterior extension; first radial of anal fin extremely long triangular plate.

The above characters have not been found in any other species of atherinids examined and are therefore considered diagnostic for the new subfamily, which at present contains a single genus as described below.

Dentatherina gen. nov.

Type species. *Dentatherina merceri* Patten and Ivantsoff.

Diagnosis. *Dentatherina* is monotypic. The diagnostic characters are given under species account.

Etymology. The name refers to the tusk-like protrusion on the anterior border of the maxilla.

Dentatherina merceri sp. nov.

(Fig. 1)

Holotype. USNM 210180, 26.4 mm SL, rotenone and dip net on coral flat, Tanjung Liang, Piru Bay, Ceram, Moluccas, Indonesia, 3°S 128°50′E, 10 January 1973.

Paratypes. 29 specimens: USNM 230364, 7 (26.6～30.3 mm SL), data as for holotype; USNM 209883, 1 (30 mm SL), rotenone and dip net near steep drop off, Tandjung Tala, Nusa Laut Island, Moluccas, Indonesia, 3°40′S 128°47′E, 16 January 1973; USNM 209578, 1 (25 mm SL), rotenone and dip net in surge channel, Tandjung Naira, Haruku Island, Moluccas, Indonesia, 3°34′S 128°28′E, 15 January 1973; USNM 211044, 1 (26.2 mm SL), bay off Tuhaha Saparua, Saaro Island, Moluccas, Indonesia, 18 January 1973; USNM 220145, 1 (22.2 mm SL), off west side of Pulau Ajer, Seribu, Indonesia, 5°46′S 106°35′E, 4 April 1974; USNM 220142, 2 (19.7～21.4 mm SL), small bay at Negros Oriental near Port Siyt, Philippines, 9°04′N 123°09′E, 14 June 1978; USNM 230370, 4 (23.6～26.0 mm SL), off north-west side of Putic Island, Palawan Province, Philippines, 10°55′N 121°02′E, 22 May 1978; USNM 230179, 3 (23.4～25.1 mm SL), rotenone near coral reef in Harvey Bay ESE of Popondetta, Papua New Guinea, 8°54′S 148°31′E, 6～7 August 1975; USNM 230368, 2 (25.1～26.6 mm SL), rotenone off a coral reef, in Milne Bay district, Basilaki Island, Papua New Guinea, 10°23′S 150°30′E, 22～25 August 1975; USNM 230365, 4 (21.4～25.2 mm SL), rotenone off a coral reef on west side of Kiriwina Island, Trobriand Islands, Papua New Guinea,

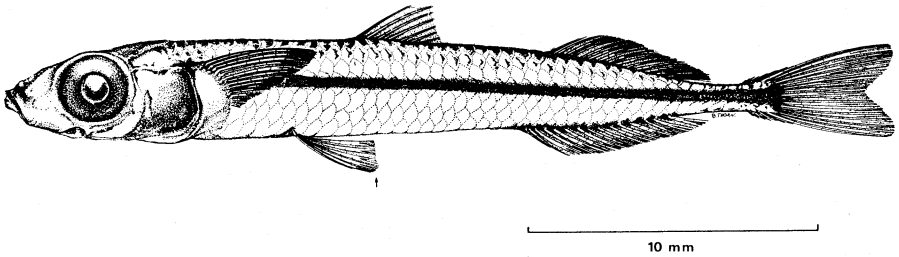

Fig. 1. Line drawing of the holotype of *Dentatherina merceri*, USNM 210180, 26.4 mm SL.

8°30′S 150°59′E, 19 September 1975; AMS I. 22654–001, 1 (18 mm SL), neuston haul, North Lagoon, One Tree Island, Queensland, Australia, 23°30′S 152°05′E, 11 November 1980; AMS I. 22653–001, 2 (17.5～18.5 mm SL), neuston haul off a reef flat, Lizard Island, Queensland, Australia, 14°40′S 145°28′E, 30 January 1980.

The holotype and paratypes were selected from about 300 specimens examined and identified as *Dentatherina merceri* in the USNM and AMS collections. These types represent every known geographic locality from which *D. merceri* has been collected.

General description

Morphometrics. Head in SL 3.7～4.3, x= 4.0; greatest body depth in SL 6.6～9.2, x= 7.6; least depth in SL 18.3～26, x=22.7; eye in head 2.4～3.1, x=2.7; snout in eye 1.4～2.4, x=1.8; premaxilla in eye 0.9～1.3, x=1.0; premaxillary process in eye 1.3～1.9, x=1.6 (see Table 1).

Meristics. Midlateral scales 40～43, x= 41.4; transverse scales 7～9; predorsal scales 14～17, x=15.4; interdorsal scales 8～12, x=9.5; vertebrae 40～43, x=41.9. Dorsal fins V～VIII Ii 11～13, x=7.1 and 12.1; anal fin Ii 13～15, x=13.4; pectoral fin Ii 11～13 x=12.2. Gill rakers in first lower gill arch 10～12, x=10.9.

Origin of first dorsal 1～4 scales in front of vertical through tips of ventrals and 2～6 scales behind vertical through tips of pectorals. Origin of ventrals from 2 scales in front to 3 scales behind vertical through tips of pectorals. Anus at or up to 3 scales in front of ventral tips (see Table 1).

External morphology. Very small, slender, subcylindrical species, apparently not exceeding 31 mm SL when fully grown. Mouth small, with labial ligament attached about halfway along premaxilla. Labial ligament forming cylindrical pouch lateral to ramus of dentary and just below lower edge of premaxilla. Premaxilla broad and long, extending just past vertical through anterior border of eye but with posterior two thirds obscured by anterior process of maxilla and labial pouch. Eye and orbit large. Caudal peduncle very slender. Body scales small, thin and highly deciduous. Lateral body scales ellipsoid or irregular, but usually dorsoventrally elongated. Circuli on scales continuous and concentric. Gill rakers moderately slender and short, less than diameter of pupil. Anus always in front of tips of ventrals. Spines in dorsals thin and weakly developed. Last spine in first dorsal almost rudimentary in many specimens. Rays of all fins flat and weakly segmented, almost juvenile in appearance.

Colour. Preserved specimens yellow-brown to green-brown overall and showing little variation in coloration from specimen to specimen. Middorsal band extending over width of one scale from occiput to origin of first dorsal, wider at this point than elsewhere with this part of line frequently broken into 2 or 3 rows of melanophores, then extending as irregular thin line to origin of caudal. Both dorsals and pectorals pigmented lightly in some specimens. Base of pectoral outlined by melanophores.

Caudal usually dusky and with two triangular marks at its base. Scale pockets distinctly outlined by melanophores above midlateral band but not below it. Midlateral band originating above upper edge of opercle, at posterior margin of orbit and extending as series of blocks or as thin line to about half length of pectoral, then widening and becoming solid to its termina-

Table 1. Body measurements and counts of 30 specimens of *Dentatherina merceri* from western Pacific Ocean and north-eastern Australia. Abbreviations: SL, standard length; H max, greatest body depth; H min, least body depth; Width max, greatest body width; Sn, snout; OD_1 origin of first dorsal fin; OD_2 origin of second dorsal fin; OV, origin of ventral fins; TV, tips of ventral fins; OA, origin of anal fin; TA, last ray insertion of anal fin; T Pec, tip of pectoral fin. Spines and unbranched rays are excluded in the counts for the elements of the second dorsal, anal and pectoral fins. Position of the fins and the position of anus is expressed as the number of scales in front of (F) or behind (B) the point of reference.

	Holotype	Mean range and standard deviation for holotype and 29 paratypes*
In SL	(SL) 26.4 (mm)	(SL) 17.50～30.3 (mm)
Head	3.7	4.0 (3.7～4.3) 0.19
H max	7.3	7.6 (6.6～9.2) 0.76
H min	20.3	22.7 (18.3～26.0) 1.81
Width max	7.5	7.6 (6.7～8.5) 0.47
Sn-OD_1	2.1	2.1 (2.0～2.2) 0.07
Sn-OD_2	1.4	1.4 (1.3～1.4) 0.04
Sn-OV	2.5	2.5 (2.4～2.6) 0.07
Sn-TV	1.9	(27) 1.9 (1.8～2.0) 0.06
Sn-OA	1.4	1.4
Sn-TA	1.2	1.1 (1.1～1.2) 0.04
In head		
Eye	3.1	2.7 (2.4～3.1) 0.20
Interorbital	3.6	4.1 (3.3～5.6) 0.51
Postorbital	2.5	2.7 (2.2～3.2) 0.26
Caudal peduncle length	2.3	2.1 (1.8～2.4) 0.16
In eye		
Snout	1.4	1.8 (1.4～2.4) 0.24
Premaxilla	0.9	1.0 (0.9～1.3) 0.09
Premaxillary process	1.6	1.6 (1.3～1.9) 0.12
Scale counts		
Midlateral scales	42	(13) 41.4 (40～43) 1.12
Transverse scales	7	(10) 7.1 (7～9) 0.83
Predorsal scales	15	(18) 15.4 (14～17) 0.92
Interdorsal scales	9	(25) 9.5 (8～12) 0.92
Fin elements counts		
First dorsal spines	7	7.1 (5～8) 0.16
Second dorsal rays	13	12.1 (11～13) 0.51
Anal rays	13	13.4 (13～15) 0.63
Pectoral rays	13	(28) 12.2 (11～13) 0.77
Position of fins		
OD_1 to TV	F 2.5	(25) F 2.4 (F 1.0～4.0) 0.73
OD_1 to T Pec	B 3.0	(21) B 4.2 (B 2～6) 1.08
OV to T Pec	F 1.0	(20) B 0.8 (B 3～F 2) 1.2
Other values		
Gill rakers in 1st lower gill arch	11	10.9 (10～12) 0.57
Position of anus to TV	F 1	(29) F 1.4 (F 0～3) 0.81
Vertebrae	43	(27) 41.9 (40～43) 0.80

* Unless otherwise indicated. Numbers in bracket preceding mean indicates the number of specimens counted or measured. Some of the paratypes have lost their scales entirely or have sustained other minor damage making counts and measurements difficult.

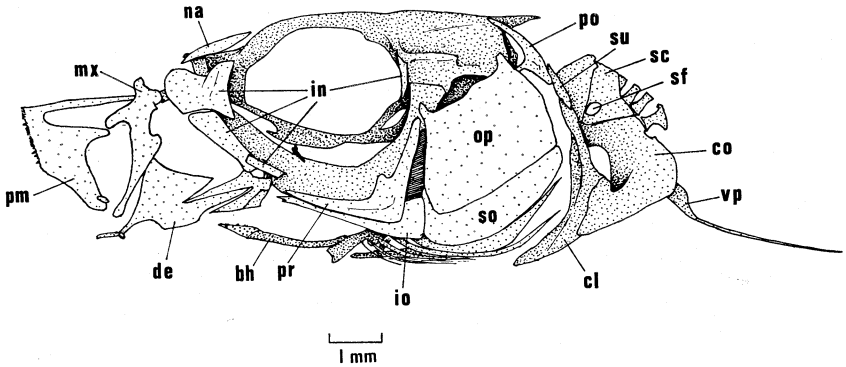

Fig. 2. Skull and pectoral girdle of *Dentatherina merceri,* left side. Abbreviations: bh, basihyal; cl, cleithrum; co, coracoid; de, dentary; in, infraorbital series; io, interopercle; mx, maxilla; na, nasal; op, opercle; pm, premaxilla; po, posttemporal; pr, preopercle; sc, scapula; sf, scapular foramen; so, subopercle; su, supracleithrum; vp, ventral postcleithrum. Figs. 2～6 drawn from dissected alizarin specimens, USNM 210180, 30 mm SL.

tion at base of caudal. Body below midlateral band unpigmented except for midventral band extending from isthmus to origin of caudal as one or two irregular lines. Dorsum of head, snout and opercle heavily pigmented. Eye dark. Melanophores frequently present on side of dentary.

Osteology

Neurocranium. Neurocranium (Fig. 3) similar to *Atherinosoma* and *Hypoatherina* (Patten, 1978), with large orbit and short rostrum. Rostrum formed by ethmoid cartilage and encased by lateral ethmoids, vomer and small round mesethmoid (Fig. 5). Vomer without anterior lateral ascending process leaving area of exposed cartilage laterally. No joint between lateral ethmoid and vomer. Olfactory nerve passing through lateral ethmoid (Figs. 3, 5, of) and emerging anteriorly in angle of that bone. Rostrum deeply excavated dorsally, forming fossa for premaxilla and rostral cartilage. Frontals forming overlapping joints with lateral ethmoids, with latter extending farther laterally than former. Ethmoid cartilage contributing only small part of membranous interorbital septum. Ethmoid cartilage with an enlarged facet ventrally for articulation with suspensorium. Lateral wing of parasphenoid supporting ethmoid cartilage posteriorly (Fig. 3, cp). Postorbital region of parasphenoid trough shaped, forming base of myodome with latter roofed by prootics. Myodome not extending into basiocciptal and without posterior opening. Otic bulla ovate and small, barely projecting from side of skull. Small intercalar overlying joint of pterotic and epiotic. Parietals entirely absent with frontals extending backwards in their place. Dorsal skull surface smooth.

Jaws and mouth. Upper jaw highly protrusible (Figs. 2, 4). Premaxillae with long slender dorsal processes firmly joined to each other for most of their length. Premaxillary processes supported by maxillae and elongate rostral cartilage. Maxilla with large spatulate process extending downwards from anterior edge and resting against premaxilla when mouth closed but swinging out sideways when mouth open. Second smaller process on posterior edge of maxilla also present. Maxilla articulating with vomer via enlarged, ossified submaxillary meniscus.

Dentary and articular forming deeply interlocking joint (Figs. 2, 4). Dorsal ramus of dentary greatly elevated and ending in acute point posteriorly. Anterior ramus very slender near symphysis due to excavation of ventral border. Mandibular canal therefore shortened and in form of inverted trough. Thick labial ligament with calcified nodules (Fig. 4), one adjacent to maxilla and other near dentary.

Teeth on premaxilla in single row laterally but set at different angles, with some projecting to outside of mouth. Teeth near symphysis

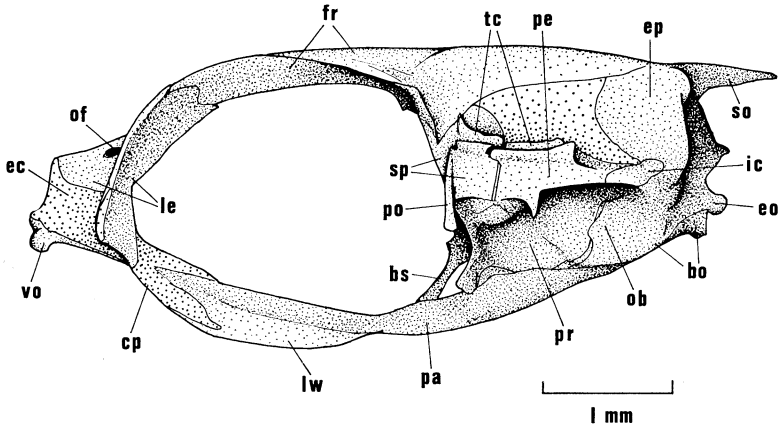

Fig. 3. Neurocranium. Abbreviations: bo, basioccipital; bs, basisphenoid; cp, palatine facet of ethmoid cartilage; ec, ethmoid cartilage; eo, exoccipital; ep, epiotic; fr, frontal; ic, intercalar; le, lateral ethmoid; lw, lateral wing of parasphenoid; ob, otic bulla; of, olfactory foramen; pa, parasphenoid; pe, pterotic; po, postorbital process; pr, prootic; so, supraoccipital; sp, sphenotic; tc, temporal canal; vo, vomer.

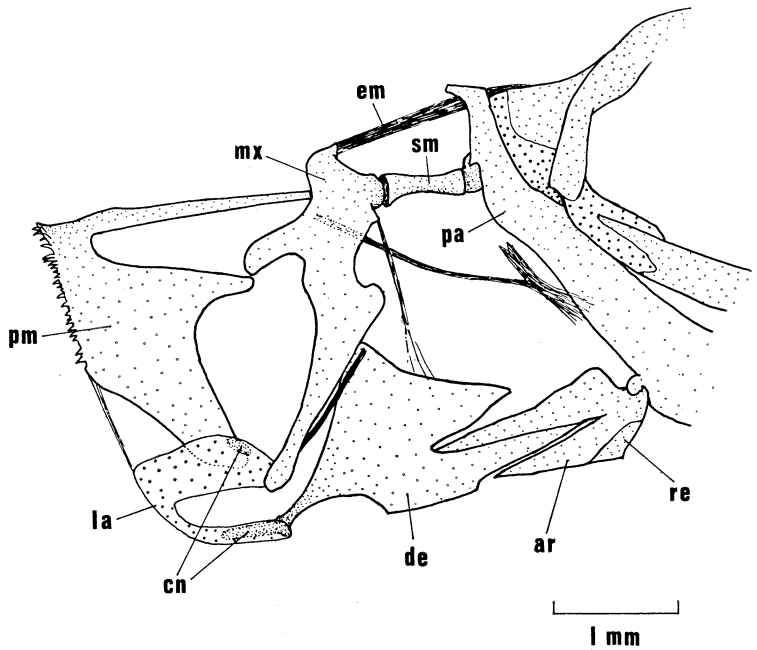

Fig. 4. Lateral view of protruding mouth parts. Abbreviations: ar, articular; cn, calcified nodules of labial ligament; de, dentary; em, ethmomaxillary ligament; la, labial ligament; mx, maxilla; pa, palatine; pm, premaxilla; re, retroarticular; sm, submaxillary meniscus.

sometimes markedly enlarged. Dentary with few or no teeth. No teeth on vomer or palatopterygoids. Crescentic toothplates on anterior cartilaginous part of basihyal ("tongue").

Suspensorium. Suspensorium elongate to span large orbit. Palatoquadrate typically atherinid except for fusion between ectopterygoid and quadrate, and between metapterygoid

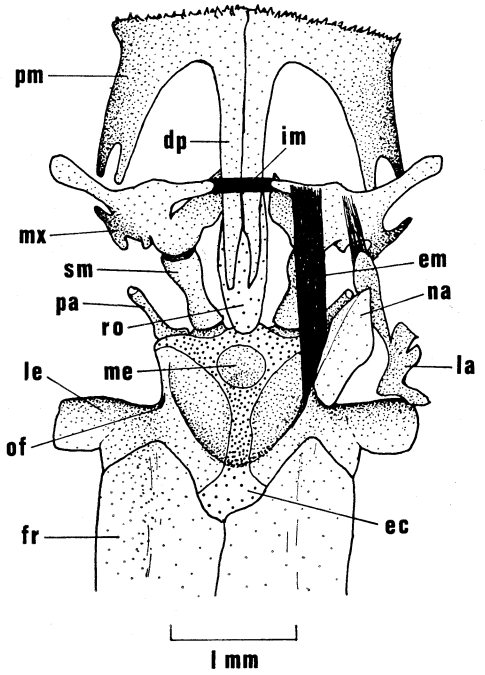

Fig. 5. Dorsal view of upper jaw with mouth open. Abbreviations: dp, dorsal process of premaxilla; ec, ethmoid cartilage; em, ethmomaxillary ligament; fr, frontal; im, intermaxillary ligament; la, lachrymal; le, lateral ethmoid; me, mesethmoid; mx, maxilla; na, nasal; of, olfactory foramen; pa, palatine; pm, premaxilla; ro, rostral cartilage; sm, submaxillary meniscus.

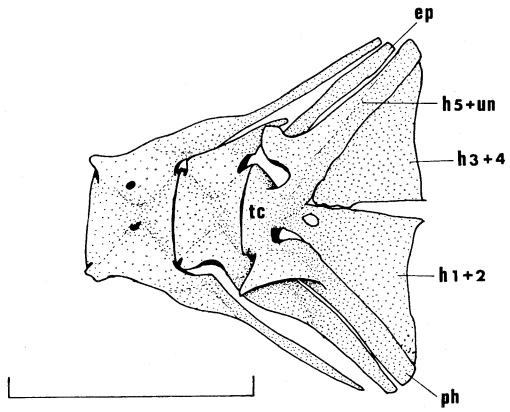

Fig. 6. Caudal skeleton, left lateral view. Abbreviations: ep, epural; h5+un, hypural 5, fused with uroneural and ural centrum; h3+4, fused hypurals 3 and 4; h1+2, fused hypurals 1 and 2; ph, parhypural; tc, terminal (ural) centrum.

and symplectic. Preopercle firmly attached, with arms forming right angle, about equal length.

Other elements of head. Opercle large (Fig. 2) with dorsal edge inclined steeply. Subopercle also large, forming ventral gill cover together with branchiostegal rays. Branchiostegals nearly always five (3 specimens with 4 on one side and 5 on other). Interopercle triangular and elongate, but without distinct notch or process on upper margin.

Cranial sensory canals in shallow grooves or in bony troughs or lying free in skin. Infraorbital canal restricted to incomplete series of bones. Three anterior infraorbital bones extending down towards preopercle. Dermosphenotic lying against anterior face postorbital process of sphenotic.

Supraorbital canal in groove extending between nasal anteriorly and temporal-dermosphenotic junction posteriorly. Short temporal canal formed from separate sections in sphenotic and pterotic (Fig. 3). Preopercular canal complete but not anastomosing with temporal canal.

First pharyngobranchial absent, second and third developed normally; small fourth upper pharyngeal toothplate also present (terminology after Nelson, 1969). Epibranchials simple and rod shaped, ceratobranchials and basibranchials not different from other atherinids. Basihyal long and narrow with only small anterior section remaining unossified. Urohyal with pair of wing-like lateral extensions ventrally but none dorsally.

Vertebral column. Precaudal vertebrae 16～17, caudal 25～27. Parapophyses present on all precaudal vertebrae. Parapophyses of last precaudal sometimes joined together by transverse bridge enclosing haemal canal. First caudal with parapophysis forming median haemal spine. First two haemal arches sometimes expanded slightly but without air bladder entering. Epipleural ribs starting on first vertebra and pleural ribs on third vertebra.

Caudal skeleton. Lower hypural plate (fused hypurals 1 and 2) typically fused to ural centrum. Rest of caudal skeleton unusual and distinctive (Fig. 6). Hypurals 3 and 4 fused together and hypural 5 fused with uroneurals and ural centrum. Only one epural present. Parhypural with broad triangular spine on either side at

base, directed anteriorly and overlapping base of preceding haemal spine. Parhypural fused to ural centrum.

Appendicular skeleton. Each pelvic bone with flat medial process, overlapping in ventral midline. Medial pelvic process with two elongate spines extending anteriorly and posteriorly and attaching to abdominal muscles. Small lateral pelvic process hook-shaped and loosely joined to fifth abdominal rib.

Pectoral girdle joined to skull by forked posttemporal, articulating with epiotic and intercalar, and by Baudelot's ligament between basioccipital and cleithrum. Small supracleithrum (Fig. 2) present between posttemporal and cleithrum. Scapular foramen small and lying entirely within scapula.

Coracoid joined to cleithrum and scapula dorsally and forming elongate joint with cleithrum ventrally. Dorsal postcleithrum absent. Ventral postcleithrum broad dorsally but tapering downwards to ventral midline as long slender tail.

Unpaired fins. Dorsal fins far apart but with complete series of interdorsal radials between them. First radial of spinous dorsal large triangular plate. Similar but more elongate plate preceding anal fin. Anal fin originating below eighth or ninth caudal vertebra. Last dorsal and anal rays each composed of two rays, sharing same radial, probably representing two fused elements.

Etymology. *P. merceri,* named after Professor Frank V. Mercer of Macquarie University whose help and encouragement in the study of the family Atherinidae will not be forgotten.

Discussion

Placement in Atherinidae. From our studies of the representatives of each of the subfamilies of the Atherinidae (Ivantsoff, 1978; Patten, 1978) we conclude that the new genus and species belongs to the Atherinidae despite its many specializations. Although the systematic position of silversides has been examined by Rosen (1964) and his predecessors (Jordan and Hubbs, 1919; Gosline, 1962) no comprehensive definition for the family has ever appeared in print. Our justification of placement of *Dentatherina* in the Atherinidae is based on the following characters which we find all atherinids share:

Body moderately elongate and slender; mouth small and terminal; lateral line absent; eyes large; two dorsal fins, well separated, first with flexible spines, second with one spine; one anal spine; pectoral fins high on body; ethmoid bone small and laminar, confined to dorsal surface of rostrum; maxilla with dorsal and internal processes; intermaxillary ligament joining dorsal processes; ethmo-maxillary ligament present; palatine-premaxillary ligament absent; premaxilla with dorsal process, combining functions of ascending and articular processes; quadrate-articular joint anterior to middle of orbit; extensive mesopterygoid nearly reaching hyomandibular posteriorly; elongate symplectic; arms of preopercle about equal length, at about right angles; infraorbital series reduced; large lachrymal; dermosphenotic lying against anterior face of postorbital process; parapophyses on all precaudal vertebrae; pleural ribs starting on third vertebra; first two vertebrae with epipleural ribs; caudal skeleton containing lower hypural plate fused to ural centrum and low neural spine on second preural centrum; large coracoid with medial shelf; pelvic bones forming overlapping joint and attached laterally to pleural ribs; interdorsal radials well developed.

Comparison with several representative specimens of the family Phallostethidae, initially because of their similar adult size, had shown only two advanced characters that are shared with *Dentatherina*: ossified submaxillary meniscus and calcified nodules within the labial ligament. These are probably convergences since all other aspects of morphology indicate very distant ancestries (for phallostethoid osteology see Roberts, 1971).

Recent generic review of the family Melanotaeniidae by Allen (1980) clearly distinguishes the rainbowfishes from the Atherinidae. The advanced characters pointed out by Allen in melanotaeniids indicate that *Dentatherina* stands with the Atherinidae and is as distantly related to the rainbowfishes as are the other silversides.

Relationship to other subfamilies. Schultz (1948), in his revision of subfamilies and genera of atherine fishes, restricted the European silversides and one monotypic Australian genus (*Atherina* spp. and *Atherinason*) to the subfamily Atherininae. Those genera with straight or convex anterior edges of premaxillaries with

undilated posterior tips, with air bladder not modified to enter the first 3 to 6 haemal arches and with hypophyses of arches not broadened or expanded, were assigned to the Taeniomembrasinae (the name subsequently amended to Taeniomembradinae by Schultz in 1950) and included *Taeniomembras, Craterocephalus, Stenatherina, Alepidomus, Hypoatherina, Pranesus* and *Atherinomorus*.

Despite the complexity of variability within the genera listed under the separate subfamilies by Schultz in 1948, Patten (1978) has found the above separation unwarranted, since all the nominal genera listed share two advanced characters: the palatine is without the ventral anterior process and the interopercle has an upper edge straight and without dorsal process. In addition, the dorsal plate of the urohyal, present in all other subfamilies, is absent in all of the nominal genera above (except for some species of *Craterocephalus* in which it appears to have redeveloped). These features distinguish Atherininae from Menidiinae, Atherioninae as well as from Melanotaeniidae and Notocheiridae. The shape of the bladder and its extension into the haemal arches, the morphology of the jaws and vertebrae appear to be too variable to be of diagnostic value at the subfamilial level.

Dentatherina shares the advanced characters with Atherininae but its large number of specialized characters indicates considerable genetic divergence. We intend the distinction of *Dentatherina* at subfamily level to indicate a separate line of evolution but at this point we do not have sufficient data to indicate its precise systematic position in the phylogeny of the family Atherinidae.

Acknowledegments

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西部太平洋産トウゴロウイワシ科の新属新種

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フィリピンからオーストラリア北東部にかけて，またモルッカ諸島からトロブリアンド諸島にかけての海域から採集されたトウゴロウイワシ科の *Dentatherina merceri* gen. et. sp. nov. を記載した．本属は頭骨，顎骨，尾部骨格が既知のトウゴロウイワシ科の諸属と著しく異なるので，独立した亜科 Dentatherininae を創設した．本亜科は旧世界の海産トウゴロウイワシ科魚類のほとんどを含有するトウゴロウイワシ亜科 Atherininae に最も近縁である．

本種は小型で，成熟個体でも標準体長は 31 mm を超えない．眼が大きく，尾柄は細い．鱗は小さく，はげおちやすい．各鰭の鰭条の分節は微弱で，ほとんど幼魚のような感じを与える．